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GEN-1 PSS non-invasive testing upgrade options

Assumptions: DIW upgrade will happen
3 years to upgrade all GEN-1 systems (i.e. 45/9 = 5 per shutdown)
All FERDPs upgraded to latest rev plus DIW analog and RSI inputs
Users who use PSS power for BLEPS need to rework there interface
MEZZIE and FESIE installation time not included

OPTION 1: FERDP replacement with PCB

This option will be very similar to the GEN-3 layout in the Mezzanine rack.

Design: (5 weeks)

Design GEN-1 Mezzanine PCB with analog DIW signals
Design GEN-1 PCB-to-PLC cables

Pre-installation: (5 weeks)

Fabricate PCBs
Assemble (stuff) PCBs
Test PCBs in lab
Fabricate PLC-to-PCB cables

Installation: (2 days)

Disconnect field wiring and remove FERDP panel (includes PLC wiring arms)
Install PCB, plug in cables with PLC wiring arms and field wiring connectors
Reroute Remote Shutter Interface wiring from PLC module to PCB

Validation:

GEN-3 cart with GEN-1 toolbox capable of analog signal injection at a third validation connector (i.e. GEN3 Chain C).

Cost: (non-recurring charges for PCB tooling, ATE prog. and photo-plotting = $1000)

PCB =	$1800
Cables =	$ 800
	$2600

OPTION 2: FERDP upgrade with validation connector PCB

This option will leave the FERDP and have a PCB, with GEN-3 validation connectors, connected to it using the same connection method as the current FE Simulator.

Design: (8 weeks)

Design interface PCB with analog DIW signals
Design PCB-to-FERDP and PCB-to-field I/O connector cables
Design new PCB test fixture for pre-installation testing of PCB

Pre-installation: (6 weeks)

Fabricate PCBs
Assemble (stuff) PCBs
Test PCBs and FERDP in lab
Fabricate PCB-to-FERDP and PCB-to-field I/O connector cables

Installation: (2 days)

Disconnect field wiring and remove FERDP panel (includes PLC wiring arms)
Install current revision of FERDP
Plug in cables from FERDP to PLC with PLC wiring arms
Install PCB, plug in cables to connect field wiring connectors and FERDP to PCB
Reroute Remote Shutter Interface wiring from PLC module to PCB

Validation:

GEN-3 cart with GEN-1 toolbox capable of analog signal injection at 38 pin validation connector.

Cost: (non-recurring charges for PCB tooling, ATE prog. and photo-plotting = $1000)

PCB =	$1200
Cables =	$ 900
	$2100

OPTION 3: FERDP upgrade with external test chassis

This option will leave the FERDP and have a permanent FE simulator mounted in the Mezzanine rack using the same connection method as the current FE Simulator. Should eliminate the need for a MEZZIE chassis.

Design: (8 weeks)

Design Chassis with analog DIW signals, test key switch, buttons and LEDs
Design Chassis-to-FERDP and Chassis-to-field I/O connector cables
Design test fixture for pre-installation testing of Chassis

Pre-installation: (8 weeks)

Fabricate Chassis
Test Chassis and FERDP in lab
Fabricate Chassis-to-FERDP and Chassis-to-field I/O connector cables

Installation: (2 days)

Disconnect field wiring and remove FERDP panel (includes PLC wiring arms)
Install current revision of FERDP
Plug in cables from FERDP to PLC with PLC wiring arms
Install Chassis and plug in cables to connect field wiring connectors and FERDP
Reroute Remote Shutter Interface wiring from PLC module to Chassis

Validation:

Similar to current GEN-1 Validation expect with a Key switch for Test Mode on the FE Simulator

Cost:

Chassis =	$2800	(assumes internal PCB)
Cables =	$ 900	
	$3700	

OPTION 4: FERDP upgrade with mini-PCBs

This option will leave the FERDP with modified terminal strip (see sketches)

Design: (2 weeks)

Design mini-PCBs (one for inputs and one for outputs)

Pre-installation: (5 weeks)

Fabricate mini-PCBs
Test FERDP in lab

Installation: (2 days)

Disconnect field wiring and remove FERDP panel (includes PLC wiring arms)
Install current revision of FERDP with mini-PCB terminal modification
Plug in cables from FERDP to PLC with PLC wiring arms
Connect field wiring connectors to mini-PCB terminal

Validation:

Similar to current GEN-1 Validation expect with a Key switch for Test Mode in Mezz rack

Cost:

PCBs =	$ 500
Cables =	$ 0
	$ 500

OPTION 5: Dave Francis Chassis (hybrid of OPTION 2 and 3)

DIW UPGRADE (GEN-1)

Manufacture	Description	Model number	Qty	Unit Price	Total Price
Allen-Bradley	16 single ended module	1771-IFE	1	$1300.00	$1300.00
Allen-Bradley	Analog interface terminal		1	$ 190.00	$ 190.00
Allen-Bradley	Prefabricated cable		1	$ 140.00	$ 140.00
GE	8 diff. exp. module	IC697ALG440	1	$1300.00	$1300.00
GE	8 differential module	IC697ALG230	1	$1300.00	$1300.00
					$4230.00